Variability of New York's Agricultural Use Values and Its Implications for Policy

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This paper compares two alternative estimates of agricultural use values in New York, one based on comparable sales information and the other on capitalized yearly income. Emphasis is placed on the variability of the values over the 1973–83 period and its implications for taxpayer equity and the financing of local governments.

Introduction

Since 1973, some New York farmland owners have been eligible for preferential property tax treatment through exemptions calculated as the difference between farmland's full value and its value in use (NYS Agriculture and Markets Law, Art. 25AA, Sec. 304). State officials now must determine per acre values in use by capitalizing estimates of annual net returns to land. This approach conforms to accepted theories of land valuation (Barkley and Boisvert) but leads to two principal administrative problems. First, a variety of crops are produced in New York and net income for land varies by soil quality and crop rotation. Second, capitalized values (and thus the size of tax exemptions) can fluctuate from year to year reflecting short-term movements in commodity and input prices and the capitalization rate.

This report deals with the year-to-year variability in farmland use values. Specific objectives are to: (a) compare alternative farmland use values for 21 New York counties and assess their variability over the 10-year period, 1973 through 1983, and (b) devise statistical methods to partition the variation in the values among the major components of the capitalization formula.

The first section of the report places the analysis in an historical perspective by describing state policies for taxing farmland and the factors which precipitated recent administrative changes in New York's program. The second section describes the data and procedures used in the analysis and a third section describes the empirical results. A concluding section is devoted to the study's implications for state property tax policy, taxpayer equity and the ability of local governments to finance public services.

Background

The New York State Legislature passed the Agricultural Districts Law in 1971 "to conserve and protect and to encourage the development and improvement of agricultural lands . . ." (New York Agricultural and Markets Law, § 300). The law provides for the formation of agricultural districts and facilitates the retention of agricultural land by: (a) restricting many of the usual options open to local governments whose boundaries overlap those of the agricultural districts; (b) requiring some state agencies to alter their administrative regulations that otherwise might adversely affect agriculture and (c) limiting the ability of governmental units to impose benefit assessments or special ad valorem levies on farmland within a district.

The law also allow owners to pay taxes on land's value in an agricultural use. Generally, owners of 10 or more acres which generated average gross sales of at least $10,000 in the preceding two years may make annual application for use-value assessment of their farm land.[1] If land receiving an exemption is converted to a non-agricultural use, a rollback tax is applicable to converted land for each of the

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[1] This provision is commonly referred to as use-value assessment but it is actually a tax exemption, equal to that portion of the tax liability due to the difference between the assessed value of the property and the use value, multiplied by an equalization rate.

preceding five years or the number of years during which use-value assessments were levied, whichever is less.[2] (Other provisions are outlined by Gardner.)

The law's provisions for use-value exemptions have been the subject of frequent, and often heated, debate. Initially, the New York State Board of Equalization and Assessment (E&A) chose to base agricultural values on comparable farm sales and to establish values by county for several categories of farmland. Over 350 separate values were established each year. Benchmark values, promulgated for the 1974 tax year, were determined initially by reviewing more than 15,000 sales and appraisals occurring between 1968 and 1973. Between 1974 and 1978, the values were reviewed annually, discussed at public hearings and then revised. Increases in use values averaged about eight percent per year during this period (McCord).

This approach, as one might expect, was criticized for reasons which trace to difficulties in apportioning value between land and improvements, accommodating high prices for small parcels in close proximity to buyers' existing land holdings, and accounting for any speculative motives reflected in a parcel's sale price.

E&A argued that these difficulties were minimized by ignoring sales and appraisals involving add-ons and transactions with nonfarm buyers (McCord) but was unsympathetic to repeated suggestions that the Legislature's intent would be better served by a methodology based on capitalized yearly net returns to land. They stressed that this method posed problems with selecting an appropriate capitalization rate; deficiencies in data were also expected because of wide variations in soil quality, topography and crop and livestock enterprises on the state's commercial farms. Such difficulties often plague exercises in asset valuation but in addition, cash rental rates for New York farmland are often casual, and reflect in-kind remuneration and non-economic considerations (Knoblauch; Locken et al.).

The debate reached a critical point when, on the basis of a review of new information on farm sales between 1974 and 1978, E&A proposed increases in agricultural use values that averaged about 50 percent statewide for the 1979 tax year. In response, the Legislature amended the law significantly. E&A was directed to develop farmland use values based on capitalization of net annual returns to farmland.

The Legislature's intervention probably reflected the political realities of the farmland assessment issue but the information base to support such a decision was extraordinarily weak. There was little evidence to shed light on the advisability of such action and the likely repercussions on the taxpayers of the state. Studies by Locken et al. and Dunne and Boisvert had shown that capitalizing net returns was an operational alternative for calculating use values but that the results were quite sensitive to the methodological conventions employed. It was impossible to conclude which approach would be preferred from an administrative point of view.

A particularly noticeable gap in the informational base is a long-term assessment of alternative computational schemes. Although E&A calculates net returns with a five-year moving average, an emerging problem with the current capitalized approach is the appearance of pronounced year-to-year fluctuations in the per acre use-value estimates. For example, percentage increases in per acre values for the 10 soil groups ranging up to 90 percent were recorded between 1981 and 1982. Uniform decreases, often in excess of 30 percent, were recorded over the 1982–83 and 1983–84 periods (Boisvert and Bills, 1984b).

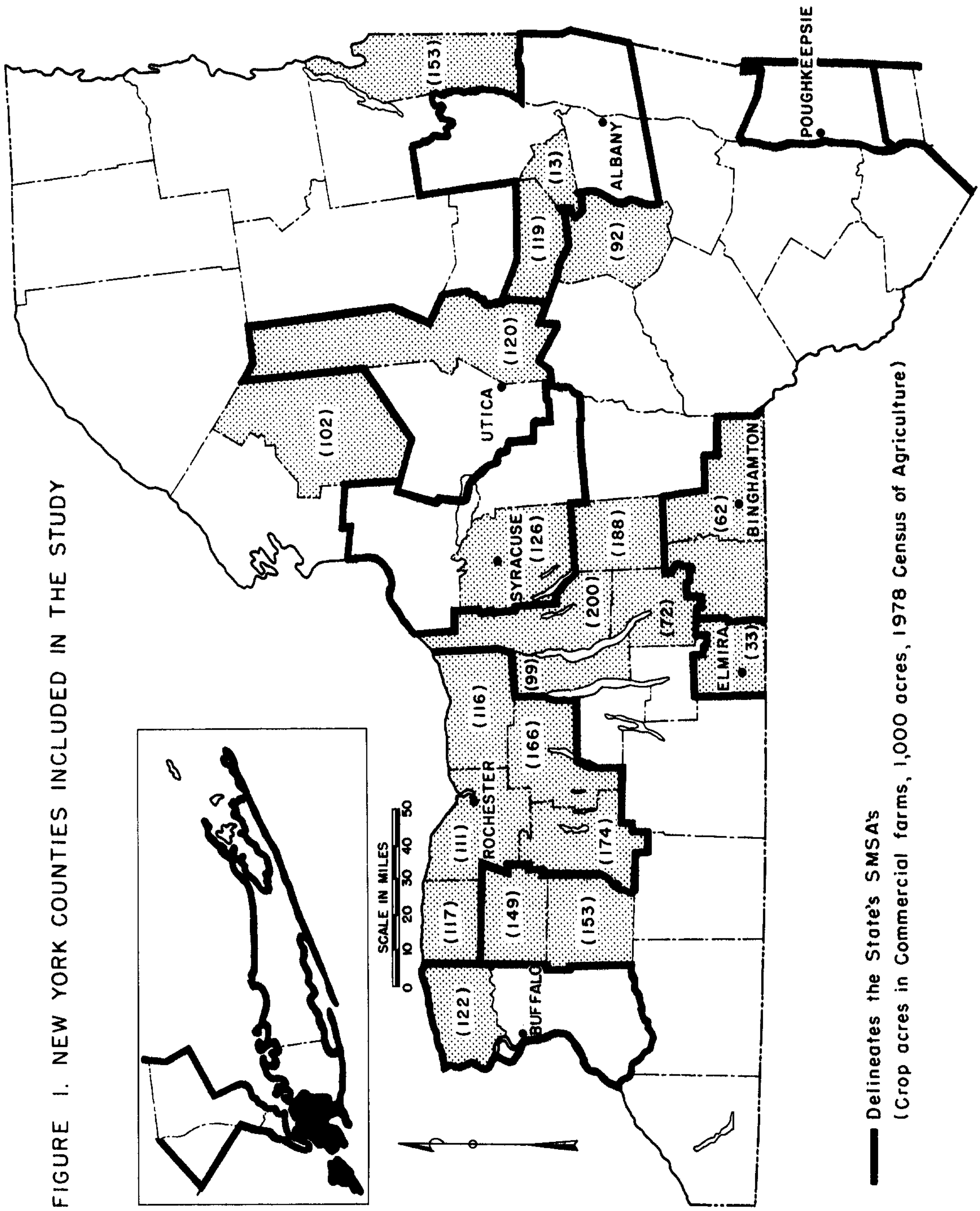
Some of this variability is due to marginal changes in the procedures for estimating these values and in the way that orchard and vineyard values are incorporated. However, from a long-term perspective, it is important to know the extent of the inherent variability in the capitalization procedure and how it compares to movements in use values based on annual updates of market sales. It is also important to identify the contribution of each component of the capitalization procedure to overall variability in capitalized net returns.

Data and Procedures

This analysis compares the market sales based method (MSM) for valuing mineral soils originally developed by E&A with the capitalized net return (CNR) method implemented in 1981. The results are for 21 New York counties for which cropland soil information could be obtained (Figure 1). These counties ac-

[2] The law provides for use-value assessment to owners not in a district willing to commit land to agriculture for eight years.

FIGURE 1. NEW YORK COUNTIES INCLUDED IN THE STUDY



▬ Delineates the State's SMSA's
(Crop acres in Commercial farms, 1,000 acres, 1978 Census of Agriculture)

count for about 40 percent of New York's commercial farms and farmland (U.S. Department of Commerce).

To begin, cropland in each county is distributed among soil mapping units and aggregated into soil productivity groups identified under new administrative procedures. Second, the land in these soil groups is redistributed among the land classes used for the period 1978–80 by making the correspondence between the total digestible nutrient (TDN) production implied by the new classes and the yields on which the old classes were based. The procedures for calculating the capitalized returns for each soil group are described below, whereas the market sales based values are those actually used by E&A for use-value assessment for 1973–80. These values differed by county.

Cropland by Soil Group

While modern published soil surveys are available for all the counties studied, estimates of acreage by soil mapping unit pertain to the total land rather than cropland in the county. Unpublished point sample data collected for the 1967 Conservation Needs Inventory are used to distribute crop production by soil mapping unit. The 1967 percentage distribution of cropland by soil mapping unit for each county is applied to the corresponding aggregate "total cropland" on commercial farms as reported in the 1978 Census of Agriculture. By necessity, this procedure assumes that the distribution of cropland soils has remained constant over the 1967–78 period (Boisvert and Bills, 1984a).

Cropland is then assigned to one of ten mineral soil groups in a land classification system developed for the New York State Department of Agriculture and Markets. Each soil mapping unit is given an index value which reflects judgments about a soil's capacity to produce TDN. Soils falling into the first eight soil groups are judged to be usable for crop production. The TDN index values are based on yield estimates for corn silage and hay, in appropriate rotations (Table 1).

In 1978 there were nearly 2.4 million acres of cropland in the 21 study counties. Only 2.2 percent of the cropland is in the highly rated group 1. Similarly, only 2.5 percent is in the least productive group. By making the correspondence between the yields and rotations for corn and hay used to group soils in 1981 and the yields which were used to define land classes, A, B, C and P in Table 1, one can effectively compare the impact of the MSM and CNR administrative alternatives on the use value of cropland in the 21 counties.

Capitalized Net Returns by Soil Group

The new procedures require that the capitalized net returns to land be established by E&A. Thus,

$$V_{tij} = \frac{N_{tij}}{r_t} \quad (1)$$

where V_{tij} is use value per acre in year t for soil group i and lime class j; N_{tij} is net residual returns to land per acre in year t for land in soil group i and lime class j and r_t is the capitalization rate for year t. Residual returns to land for each of the soil groups are based on enterprise budgets for corn silage and hay, weighted according to appropriate rotations.[3] As required by law, the capitalization rate is the effective interest rate on new Federal Land Bank loans made in the Springfield District. To reduce year-to-year fluctuations both the net returns and the capitalization rate in year t are calculated as a simple five-year moving average using the most currently available cost and returns data. This necessitates a two-year lag (e.g., for t = 1981 values are based on 1975–79 average).

Because the new system for calculating agricultural use values has been in operation only since 1981, it was necessary to construct capitalized returns for the years 1973 through 1980 (see Boisvert and Bills, 1984b). The input requirements and yields were assumed to remain constant, isolating the variation due to changes in input and output prices and capitalization rates.[4]

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[3] According to Knoblauch and Milligan:
In total, 14 economic profiles (residual returns to land) were constructed for eight soil groups. Soil Groups I through VI have an economic profile for high-lime and another for low-lime soil mapping units. Soil Groups VII and VIII have an economic profile for low lime only . . . For all except Soil Group VIII, the economic profile consists of an enterprise budget for corn and an enterprise budget for hay with the net income for the total economic profile being weighted on the specified rotation (pp. 1–2).

[4] The procedures used to calculate residual returns from corn and hay budgets are similar to those used by the state in 1981–83 but the agricultural value estimates differ in two respects. First, in the values used for tax purposes during 1981–83, net returns to land in orchards and vineyards were given a small weight to reflect the fact that these crops occupy a small fraction of the mineral-soil cropland. These returns are ignored here because in 1984 a decision has been made to treat orchards and vineyards separately.

Table 1. Estimated Cropland by Soil Group, 21 New York Counties, 1978[a]

1981 Soil Group[b]	Thousand Acres[c]	Percent[c]	1971–1980 Land Class[d]	Thousand Acres[c]	Percent[c]
Group 1(90–100)	52	2.2	Class A ≥ 100 bu. ≥ 3.5 tons	531	22.2
Group 2 (80–89)	479	20.1			
Group 3 (70–79)	430	18.0	Class B > 15 tons 2–3.5 tons	709	29.7
Group 4 (60–69)	279	11.7			
Group 5 (50–59)	471	19.7	Class C < 15 tons < 2 tons	964	40.4
Group 6 (40–49)	368	15.4			
Group 7 (25–35)	250	10.5	Class P Pasture	184	7.7
Group 8 (<24)	59	2.5			
Total	2,388			2,388	

Sources: Cropland totals are estimates of total cropland from the 1978 Census of Agriculture. The distribution by 1981 soil group was based on unpublished data on cropland by soil mapping unit obtained from the 1967 Conservation Needs Inventory.

[a] See Figure 1 for a list of counties.

[b] These soil groups were developed for the New York State Department of Agriculture and Markets and are to be used in New York State's use-value assessment program. All soil mapping units are classified by a TDN productivity index (given in parentheses, where 100 = 4.54 tons of TDN per acre). Production is assumed to take place in appropriate rotations. Detailed information on the classification of soils by mapping units is provided to the local Soil and Water Conservation Districts for purposes of calculating the distribution of soils by tax parcel.

[c] Rounded to nearest thousand acres. Detail may not add due to rounding.

[d] Land classes used for agricultural value assessment in New York prior to 1981. The numbers below the class are corn (grain or silage) and hay yields associated with each class. To facilitate comparisons, these yields were converted to TDN, and after assigning a rotation, a correspondence between the two systems was obtained: class A = groups 1 and 2; class B = groups 3 and 4; class C = groups 5 and 6, plus ½ group 7; class P = ½ group 7, plus group 8.

Despite attempts to reduce year-to-year fluctuations in the capitalized returns by using five-year averages, it is still important to understand the contribution of the several components of the formula to the remaining overall variability. This decomposition begins by rewriting equation (1) as (ignoring subscripts)

$$V = \frac{R}{r} - \frac{C}{r}. \qquad (2)$$

Letting $X_1 = R/r$ and $X_2 = C/r$, the variance of V can be written as

$$\begin{aligned} \sigma_V^2 &= \mathrm{Var}\,(X_1 - X_2) \\ &= \sigma_{X_1}^2 - 2\sigma_{X_1,X_2} + \sigma_{X_2}^2. \end{aligned} \qquad (3)$$

Because X_1 and X_2 are products of random variables, the decomposition of σ_V^2 proceeds according to Bohrnstedt and Goldberger. Boisvert and Bills (1984b) develop the exact expressions for the variance and covariances for products of random variables in this application. Using the Kendall-Stuart asymptotic approximation (where E is the expectation operator, σ^2 is variance and σ is covariance)

$$\begin{aligned} \sigma_{X_1}^2 = {} & E^2(R)\sigma_{1/r}^2 + 2E(R)E(1/r)\sigma_{R,1/r} \\ & + E^2(1/r)\sigma_R^2 + RM_{X_1} \end{aligned} \qquad (4)$$

$$\begin{aligned} \sigma_{X_2}^2 = {} & E^2(C)\sigma_{1/r}^2 + 2E(C)E(1/r)\sigma_{C,1/r} \\ & + E^2(1/r)\sigma_C^2 + RM_{X_2} \end{aligned} \qquad (5)$$

$$\begin{aligned} \sigma_{X_1,X_2} = {} & E(R)E(C)\sigma_{1/r}^2 \\ & + E(R)E(1/r)\sigma_{1/r,C} + E(1/r)E(C)\sigma_{R,1/r} \\ & + E^2(1/r)\sigma_{R,C} + RM_{X_1,X_2}. \end{aligned} \qquad (6)$$

The RM's are the remainders of higher order terms.[5] Substituting equations (4), (5) and (6) into equation (3),

$$\begin{aligned} \sigma_V^2 = {} & \{E^2(1/r)\sigma_R^2 + E^2(1/r)\sigma_C^2 + [E^2(R) \\ & - 2E(R)E(C) + E^2(C)]\sigma_{1/r}^2\} \\ & + 2[E(R) - E(C)]E(1/r)\sigma_{R,1/r} \\ & + 2[E(C) - E(R)]E(1/r)\sigma_{C,1/r} \\ & - 2E^2(1/r)\sigma_{R,C} + RM_{X_1} + RM_{X_2} \\ & - 2RM_{X_1,X_2} \end{aligned} \qquad (7)$$

The first three terms of equation (7) are the direct contributions of R, C and 1/r to the variance of V. The next three terms are the first-order interaction effects, while the remainders represent higher order interactions. Each of these interactions reflects an influence on the variance of V that cannot be decom-

Second, agricultural values for the poor soils have been set at nominal values when estimated net returns were negative. Unless stated otherwise, these negative values were set to zero here.

[5] For this decomposition to be useful, the higher order terms in the remainder must be small (Burt and Finley).

posed and attributed to one of the specific components. Burt and Finley, in a related application, normalize each of the first six terms by dividing each by the sum of the first 3 terms. Thus, the terms (where S is the expression in { } from equation (7))

$$(8) \qquad P_R = E^2(1/r)\sigma_R{}^2/S;$$

$$(9) \qquad P_C = E^2(1/r)\sigma_C{}^2/S; \text{ and}$$

$$(10) \qquad P_{1/r} = [E(R) - E(C)]^2\sigma_{1/r}{}^2/S;$$

can be interpreted as the net effects directly attributable to the three components, respectively. These interaction effects can be measured relative to the direct effects

$$(11) \qquad P_{R,1/r} = 2[E(R) - E(C)]E(1/r)\sigma_{R,1/r}/S;$$

$$(12) \qquad P_{C,1/r} = 2[E(C) - E(R)]E(1/r)\sigma_{C,1/r}/S; \text{ and}$$

$$(13) \qquad P_{R,C} = -2E^2(1/r)\sigma_{R,C}/S.$$

Empirical Results

Use values per acre resulting from the two valuation methods are compared for the 1973–81 period, with 1981 values being projected on the basis of 1973–80 rates of change. Several factors, however, hinder the comparison. Differences in cropland classification were important but the correspondence between the two systems was made rather easily. The major difficulty is that agricultural values based on the market sales method (MSM) involve separate values by county for each land class, while a single set of capitalized net returns to land (CNR) is applied to all upstate mineral soils. An efficient means of comparison is a weighted average per acre use value for the 21-county aggregate (Table 2). Over the period 1973–81, the average CNR-value per acre is $283; the values range from a low of $91 in 1974 to a high of $437 in 1978. The average MSM-values per acre range from $136 in 1973–74 to a projected high of $244 per acre in 1981. With the exception of the first two years, the CNR-values were at least 36 percent higher than the MSM-values and in 1978, the difference was more than 100 percent.

From a policy perspective, it is disturbing that these two methods yield such apparently inconsistent results. Both have a sound basis in theory, but operationally nothing in the procedures insures consistency. The CNR-values are influenced by short-term fluctuations in agricultural product and input prices. The highest values (in the mid-1970's) are explained largely by the favorable product prices in the early 1970's. Since the data on which the

Table 2. Alternative Agricultural Use Values of Cropland, 21 New York Counties[a]

	1973–1980 Land Classes[b]														
	A			B			C			P			Average		
Year	CNR[c]	MSM[d]		CNR	MSM		CNR	MSM		CNR	MSM		CNR	MSM	
	dollars/acre														
1973	212	248	(85)[f]	117	149	(79)	27	81	(33)	0	52	(0)	93	136	(68)
1974	204	249	(82)	111	150	(74)	30	81	(37)	0	52	(0)	91	136	(67)
1975	428	291	(147)	276	174	(159)	98	96	(102)	0	61	(0)	217	160	(136)
1976	532	317	(168)	347	193	(180)	128	100	(128)	0	66	(0)	273	173	(158)
1977	630	345	(183)	421	213	(198)	168	112	(138)	0	71	(0)	333	191	(174)
1978	775	358	(216)	554	224	(247)	240	122	(197)	28	76	(37)	437	201	(217)
1979	710	392	(181)	470	255	(191)	201	144	(140)	0	86	(0)	384	228	(168)
1980	703	392	(179)	487	255	(189)	215	144	(149)	0	86	(0)	387	228	(170)
1981[e]	633	415	(153)	482	275	(154)	163	156	(104)	0	91	(0)	333	244	(136)
Average[g]	536	334		358	210		141	115		3	71		283	189	
Standard Deviation	212	62		160	47		77	28		9	15		126	40	
Coefficient of Variation	40	19		45	22		55	24		300	21		45	21	

[a] See Figure 1 for the counties included.

[b] They are the land classes used for agricultural value purposes during these years. See Table 1 and McCord for more details.

[c] Capitalized net returns to land (CNR) developed using procesures described in the text. These are weighted averages, weighted by the acreages by land class.

The correspondence between the 1973–80 land classes and soil classes used since then is outlined in Table 1.

[d] Calculated using the agricultural values promulgated by E&A in these tax years. They are based on market sales information and differ by county. These are weighted averages, weighted by the acreages by land class.

[e] The MSM-values are projected on basis of average growth rates 1973–80.

[f] This is the percent CNR is of MSM.

[g] Although the values for CNR are available for 1982 and 1983, the summary statistics are calculated on the 1973–81 period for comparison purposes.

CNR-values are based are lagged two years, values peaked in 1978.

Throughout the period, E&A incremented its initial values upward by about eight percent a year. This followed a general movement in the value of farm real estate in New York (McCord). Based on this nine-year trend, it is tempting to conclude that the CNR-values would most likely continue to lie above the MSM-values. Such a generalization is misleading, given that the CNR-values have continued to fall in 1982 and 1983 (Boisvert and Bills, 1984b). Since MSM-values are not available after 1980, it is impossible to know the exact nature of the differences. However, in 1979, E&A recommended a 50 percent increase in the MSM-values over the previous year. This recommendation was based on data from a 1974–78 sample of farmer-to-farmer land sales and would have raised the 1980 and 1981 MSM-values above the CNR-values (Boisvert and Bills, 1984a). This suggests that E&A's eight percent yearly adjustments throughout the 1970's, and the 1981 projections used in this paper, were on the low side.

For the 21-county aggregate, the absolute difference in the per acre use values between land classes is generally larger for the CNR-method than for the MSM-method (Table 2). In percentage terms, the situation is less clear. For example, the CNR-value for "A" cropland averages $536 per acre. This is $178 per acre or 50 percent higher than the value of "B" land. Using MSM-estimates, the value of "A" land is 59 percent higher than "B" land. The situation between "B" and "C" land is just the reverse. For the MSM-estimates, the average value for "B" land is about 83 percent higher than for "C" land. The difference when use values are estimated by CNR is $217; the value of "B" land is estimated to be 153 percent higher than for "C" land.

The CNR-method consistently places relatively higher differential values on the most productive cropland. The explanation is probably inherent in the nature of the two procedures. As productivity rises, gross revenues in most budgeting procedures increase proportionately more than production costs. In contrast, the differences in MSM-estimates across land classes are determined on a more subjective basis. Allocations of a parcel's sales value by land class lead to smaller differentials, particularly between cropland of low to moderate quality.

The variation in the CNR use values over the 1973–81 period as measured by either the standard deviation or the coefficient of variation is substantially larger for the MSM-values (Table 2). For the average per acre values, as well as for land classes "A," "B" and "C," the CNR's coefficients of variation are about double those for the MSM. This is not unexpected, given the sensitivity of capitalized net returns to short-run fluctuations in agricultural input and output prices.

The relatively small variation in the MSM-values is explained in large part by the fact that E&A elected to increase the initial set of values by approximately eight percent a year (McCord). Nothing more can be done to analyze the variation in these values. However, it is possible to determine which of the components are responsible for the variation in CNR-values. For this analysis, data for 1982 and 1983 were added; the results are summarized in Tables 3 and 4. Capitalized net returns were deflated to abstract from variability due strictly to trend in the nominal revenue (R) and cost (C). As Burt and Finley suggest, if the components of the decomposition contain a strong trend, the higher order terms will remain large and the approximation will be imprecise. The result in this case was to reduce the trend in R and C but because many of the data points were divided by a number less than 1, the overall variance of R^*-C^*, and thus V^* (an * denotes deflated values) was increased. In all but one case, the variance relative to the mean, as measured by the coefficient of variation, declined.

In this case, the approximation performs well; the largest relative error is for soil group 7 and is only six percent (Table 4). The direct contributions of the three components R^*, C^*, and $1/r$ are summarized in the first three columns. In all soil groups, less than two percent of the direct contribution to variance in the deflated value of $V(V^*)$ is due to the capitalization rate. The direct contribution of R^* and C^* do not exhibit this consistency. For soil group 1, R^* is responsible for 80 percent of the direct contribution to the variance in V^*. The importance of R^* falls as one moves to higher soil groups. For groups 7 and 8, R^* is responsible for less than one-quarter of the direct contribution. Just over three-quarters of the direct variance in V^* is attributable to C^*. The contribution of C^* falls as one moves to the higher productivity soils and is only 18 percent for group 1.

The covariance effects are also important,

Table 3. 1973–83 Average Agricultural Use Values ($ Per Acre) Based on Capitalized Residual Returns, 21 New York Counties[a]

Soil Group[b]	Average		Variance		Coefficient of Variation	
	Nominal	Deflated[c]	Nominal	Deflated	Nominal	Deflated
	----- $ per acre -----					
1	604	812	50,714	67,194	37	32
2	528	712	36,519	48,292	36	31
3	416	558	25,407	31,508	38	32
4	260	346	16,940	27,672	50	48
5	232	307	12,675	17,650	49	43
6	42	48	5,293	11,600	173	224
7	−170	−242	3,869	10,714	−37	−42
8	−20	−28	582	1,030	−120	−115

[a] See Figure 1 for the counties included. These are capitalized net returns developed using procedures described in the text. They are weighted averages, weighted by the county acreages in each soil productivity and lime class. Negative values for soil groups 6, 7 and 8 are retained here. See Boisvert and Bills (1984b) for the yearly figures by soil productivity group.
[b] Soil productivity classes are those used by E&A since 1981. See Table 1 for details.
[c] For purposes of these calculations, V was deflated (1977 = 100) by dividing it and R and C by a five-year average index of the value of New York Farm Real Estate (USDA, 1975, 1979, 1981, 1983; Clifton and Crowley, 1973). It might be argued that these components should have been deflated by an index of prices paid or received. However, this was not possible because many of the components of such indexes were used to construct R and C.

particularly for the first five soil groups; the total covariance effect is negative and averages 27 percent, the size of the total direct contribution. Without this negative relationship, the variation in V* would be even greater. Furthermore, the covariances between R* and 1/r nearly offset those of C* and 1/r. Thus, the covariance effect is almost totally attributable to R* and C* and the role of 1/r is minimal.

Summary and Implications

The New York Legislature provided for use-value exemptions more than a decade ago. To date, the policy debate has focused almost exclusively on procedures used to value New York's farmland in its current use. In 1981, use values based on farm sales and appraisals were replaced by values based upon a soil productivity index and the capitalization of net

Table 4. Decomposition of the Variance of the 1973–83 Deflated Capitalized Value of Agricultural Land, 21 New York Counties

Soil Group	Direct Effects[a]				Covariance Effects[a]				Total Variance of Capitalized Value[b]	Linear Approximation	Relative Error[c]
	Revenue	Cost	Capitalization Rate	Total	Revenue and Rate	Cost and Rate	Cost and Revenue	Total			
1	72,985 (0.80)	16,846 (0.18)	1,627 (0.02)	91,458	9,562 (0.10)	−9,276 (−0.10)	−25,292 (−0.28)	−25,006	67,194	66,452	0.01
2	49,617 (0.79)	12,276 (0.19)	1,250 (0.02)	63,143	7,370 (0.12)	−6,875 (−0.11)	−15,788 (−0.25)	−15,293	48,292	47,850	0.01
3	31,143 (0.71)	11,915 (0.27)	769 (0.02)	43,827	4,983 (0.11)	−5,346 (−0.12)	−12,338 (−0.28)	−12,701	31,508	31,126	0.01
4	24,853 (0.67)	12,006 (0.32)	296 (0.01)	37,153	2,717 (0.07)	−3,153 (−0.08)	−9,777 (−0.26)	−10,213	27,672	26,942	0.03
5	14,533 (0.61)	9,224 (0.38)	234 (0.01)	23,991	2,030 (0.08)	−2,522 (−0.11)	−6,119 (−0.26)	−6,611	17,650	17,380	0.02
6	6,598 (0.45)	8,011 (0.55)	6 (0.00)	14,615	219 (0.01)	−355 (−0.02)	−3,406 (−0.23)	−3,542	11,600	11,073	0.05
7	2,299 (0.21)	8,537 (0.78)	142 (0.01)	10,978	−672 (−0.06)	1,690 (0.15)	−1,890 (−0.17)	−872	10,714	10,106	0.06
8	347 (0.24)	1,081 (0.76)	2 (0.00)	1,430	−30 (−0.02)	51 (0.04)	−431 (−0.30)	−410	1,030	1,020	0.01

[a] Derived from equations (8)–(13). Reading from left to right, the numbers in parentheses are P_{R^*}, P_{C^*}, $P_{1/r}$, $P_{R^*,1/r}$, $P_{C^*,1/r}$ and P_{R^*,C^*}, respectively.
[b] From Table 3.
[c] Total variance less the linear approximation divided by total variance.

returns to land. The impact of these procedural changes for agricultural use values, particularly the variability in values over time, is the focus of this paper. The results demonstrate that computational choices in the New York situation significantly affect the use value of cropland in the aggregate, as well as the relative values of land of different quality.

Based on the distribution of 2.4 million acres of cropland by productivity class in 21 counties, the weighted average CNR-value in 1973–74 would have been lower than the average MSM-values actually implemented. From 1975 through 1980, the CNR-values would have been substantially higher than the MSM-values. Since 1978, there has been a general downward trend in the CNR-values. Had E&A continued to develop MSM-values, it is likely that they would have been higher than the CNR-values in the 1980–83 period.

Because numerous other factors affect participation in the agricultural assessment program, it is not possible to determine how these two methods of use valuation would affect participation over time. However, it is clear that when the average CNR-values are highest, they are highest across individual soil groups as well. Thus, other things equal, neither of the methods would have led to consistently larger tax exemptions over the program's 10- to 12-year history.

The results also have policy significance for farmland retention stemming from the relative valuation of cropland of different quality. In the case of the CNR-method, the most productive "A" land is valued on average at 3.8 times the value of relatively low quality "C" land. For the MSM-values, "A" land is valued at only 2.9 times the value of "C" land. Given that local assessed values are unlikely to be differentiated as effectively by cropland quality, the CNR-values may provide a relatively greater tax exemption to the less productive soils.

The variability of the CNR-estimates, when compared to the MSM approach, has several implications for policy. First, the added uncertainty about the exemption value from year to year may decrease the attractiveness of committing land to an agricultural use for an extended period. Second, because of the two-year lag in data, and the fact that the CNR-values reflect in large part the capitalized net value of dairy feed, the fluctuations can also be out-of-phase with the general trends in state farm income. Finally, there is increased concern about the potential effects of the program on the stability of the property tax base from local governments in rural areas, where agricultural property constitutes a significant proportion of the tax base. This problem is yet to be documented, but as the size of the exemptions change, tax rates on property which remains taxable could change dramatically. This would shift some of the tax burden to non-agricultural land. Since tax rates would change, the percentage of property values exempt may not accurately reflect the tax benefits afforded farmland owners. On the other hand, any state reimbursement for lost local revenues would accommodate such inequities, but would shift the cost of the program to taxpayers across the state.

Clearly each method for estimating use values is not without its difficulties. Administratively, the MSM-values are more stable over time and are derived from procedures most consistent with local assessment practices. They provide flexibility in distributing economic value to broadly defined land classes. The subjective judgment involved is always subject to criticism.

Considerable judgment and flexibility are also required in the design of CNR-procedures. But, once implemented, the change in values from year to year becomes a function of annual movements in farm prices, costs and interest rates. This leads to serious problems for the less productive soils because the values can be negative. Most of the variation in the CNR-values for the highly productive soils is due to variation in gross revenue. One must be concerned about a procedure whose results are affected substantially by market prices for agricultural commodities that are inherently unstable from year to year. The concern is particularly acute if the commodities are ones such as corn silage and hay for which market information is difficult to obtain.

The options for resolving these difficulties with the CNR-calculations are as much political as they are grounded in economic logic. One could obviously increase the length of the moving average, but, at least in the short term, difficult decisions regarding the technology, prices and cost data for historical years would be necessary. Another alternative would be to continue yearly budget calculations but restrict the change from year to year to an arbitrary upper or lower limit (e.g. plus or minus 5 or 10 percent). This strategy would have the distinct advantage of limiting short-term fluctuations while accommodating longer-term trends if the limits in either the positive or negative direction are triggered over a period of years.

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